Evergreen Resources Management
2 Righter Parkway, Suite 200
Wilmington, DE 19803

April 14, 2014

Mr. C. David Brown, Ph.D., P.G.
Pennsylvania Department of Environmental Protection
2 East Main Street
Norristown, PA 19401

Re: Site-Specific Screening Procedure and Development of Site-Specific Soil Criteria for Lead
Philadelphia Energy Solutions -Philadelphia Refinery

Dear Mr. Brown:

Philadelphia Refinery Operations, A Series of Evergreen Resources Group, LLC (Evergreen), is pleased to present this revised approach to develop a screening process for soils at the Philadelphia Energy Solutions (PES) Philadelphia Refinery (Facility) as discussed in the January 3, 2014 meeting with the Pennsylvania Department of Environmental Protection (PADEP), Evergreen, PES and Langan Engineering and Environmental Services (Langan). Evergreen is submitting this letter to document the soil screening approach discussed during the meeting on January 3, 2014.

The compounds of concern (COC) for the Facility include the parameters listed in the Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001 [provided in Chapter VI, Section E of PADEP's Closure Requirements for Underground Storage Tank Systems (263-4500-601) revised September 8, 2012] in addition to 1,2,4-trimethylbenezene and 1,3,5-trimethylbenzene. The complete list of the COCs is provided in the table below.

1: Parameter List

Metals	CAS#
Lead (total)	7439-92-1
Volatile Organic Compounds	**CAS#**
1,2-Dichloroethane	107-06-2
1,2-Dibromoethane (Ethylene dibromide)	106-93-4
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7
Semi-Volatile Organic Compounds	**CAS#**
Anthracene	120-12-7
Benzo(a)anthracene	56-55-3
Benzo (g,h,i) perylene	191-24-2
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

The process outlined in this approach will be followed for these COCs, as well as for any additional compounds included in soil sampling activities, as may be appropriate.

Soil Screening Procedure

The tiered screening procedure developed for the Facility is based on the current and anticipated future non-residential use of the Facility and is shown in Figure 1. In accordance with 25 PA Code §250.305 and PADEP's Technical Guidance Manual (TGM), compounds detected in soil will be first screened against the respective non-residential (surface or sub-surface) soil medium specific concentration (MSC) and any compounds that exceed the MSC will be further screened against the United States Environmental Protection Agency's (EPA's) Industrial Soil Regional Screening Levels (RSL). Because, as discussed during the January 3, 2014 meeting, the groundwater exposure pathway at the Facility is incomplete for human receptors, and groundwater impacts are evaluated via the groundwater and/or surface water pathway, a third screening step is proposed prior to calculating site-specific criteria and completing a cumulative risk assessment. The third step in the screening process compares any compounds that exceed the PADEP Non-Residential MSC and the EPA's Industrial Soil RSL against the PADEP's Non-Residential Direct Contact MSC. To maintain conservatism, all soil samples will be screened against the more conservative 0-2 feet below ground surface (bgs) direct contact criteria regardless of sample depth in case the soils are re-used at the Facility. This approach assumes that all soils will be addressed under the pathway elimination option of the Site Specific Standard, unless a calculated risk-based standard is used under the Site Specific Standard.

The process for evaluating vapor intrusion and potential ecological impacts from soil are not addressed in this soil screening approach. Should concentrations in soil in areas of current or future inhabited buildings exceed acceptable vapor intrusion screening limits; these locations will be addressed by completing a vapor intrusion investigation following the current PADEP policy and guidance. Similarly, potential ecological impacts will be evaluated on an AOI-specific basis and appropriate ecological-based criteria will be utilized in those areas.

Any soil data collected for Facility characterization and delineation purposes will be evaluated using the procedure outlined above. Soil data summary tables will be provided with each Act 2 report and these tables will compare the data to each of the above-specified criteria. Any compounds that exceed the PADEP Non-Residential Soil MSC, EPA Industrial Soil RSL, and PADEP Direct Contact Screening Value, will be carried through a cumulative risk assessment. Consistent with the PADEP TGM and the current approach for the Remedial Investigation Reports submitted to date, compounds detected below the screening criteria will not be considered to contribute significantly to risk and will not be carried through the cumulative risk assessment. The cumulative risk assessment, described below, will be completed in accordance with the TGM.

Cumulative Risk Calculation [AOI-Specific]

As discussed above, any compounds with concentrations detected above the soil MSCs, EPA Region 3 RSLs, and direct contact numeric values will be carried through a cumulative risk assessment, with the exception of lead as discussed below. In accordance with the TGM, the total cumulative risk should not

exceed 1E-04 for carcinogenic compounds and the hazard index (HI) should not exceed 1 for non-carcinogenic compounds. For the cumulative risk assessment, the 95th percent upper confidence limit (UCL_{95}) of the mean soil COC concentration will be utilized as the exposure point concentration (EPC). The UCL_{95} is used as an appropriate estimate of concentrations likely to be contacted over time, and is the recommended exposure point concentration in human health risk assessments, except in cases where the UCL_{95} is higher than the maximum concentration. UCL_{95} values for soil will be derived using EPA's ProUCL Version 5.0 software. Risk will be calculated for each individual carcinogenic compound using the EPC and the total cumulative risk will be the sum of the risk for all carcinogens. Similarly, the hazard quotient (HQ) will be calculated for each individual non-carcinogenic compound [based on the EPC] and the HI will be the sum of all of the individual HQs.

The only exception to this process is for lead which will be evaluated as described in the January 27, 2014 technical memorandum, entitled "Development of Lead Attainment Standard," accepted by the PADEP through electronic mail dated March 10, 2014. Attachment A presents the calculation of the proposed site-specific lead standard at the Facility.

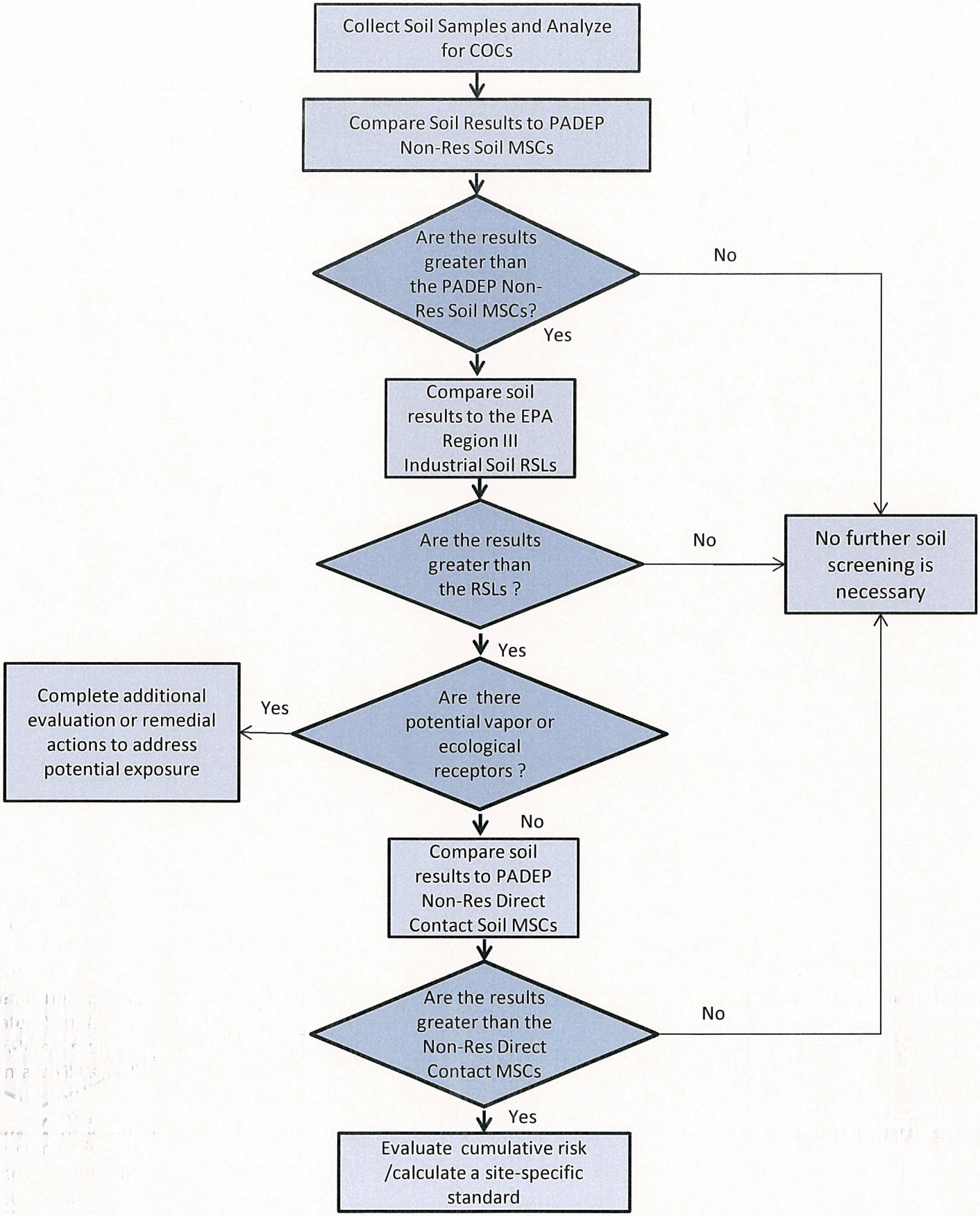
If you have any questions or require more information, please feel free to contact me at (302) 477-0192 or jroppenheim@evergreenresmgt.com. If you agree with the above approach, please email written acceptance to me. As always, I appreciate your time and continued cooperation.

Sincerely,

James Oppenheim, PE
Vice President

cc: Charles D. Barksdale, PE, PES
Kevin Bilash, USEPA
Kevin J. McKeever, PE, PG, Langan Engineering
Jennifer Menges, Stantec Consulting Services, Inc.
Tiffani Doerr, PG, Aquaterra Technologies, Inc.

Figure 1
Soil Screening Process



Attachment A

Calculation of Site-Specific Lead Standard
U.S. EPA Technical Review Workgroup for Lead,
Adult Lead Committee
Version date
6/21/09

Variable	Description of Variable	Units	Value
$PbB_{fetal, 0.95}$	95th percentile PbB in fetus	ug/dL	10
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	Geometric standard deviation PbB	--	1.8
PbB_0	Baseline PbB	ug/dL	1.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.05
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	180
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365
PRG	**Preliminary Remediation Goal**	**ppm**	**2,725**

Notes:

ug/dl = micrograms per deciliter
ug/day =micrograms per day
g/day = grams per day
days/yr = days per year
ppm = parts per million
PbB = blood lead level
PRG represents the site-specific standard for lead